

Friendly Fire Off: Does Cooperative Gaming in a Competitive Setting Lead to Prosocial Behaviour?

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Abstract

The increasing popularity of online videogames has raised questions concerning their potential to influence online and offline social behaviour. Previous research on social behaviour in relation to playing videogames has often focused on either cooperation (playing in pairs against the game) or competition (playing alone against other players); however, videogames, particularly multiplayer online games, often include both. This study investigates prosocial behaviour in videogames with both cooperative and competitive elements—team-based player versus player (PvP) games—and aims to examine whether the amount of time spent playing these games is related to in-game prosocial behaviour. A cross-sectional survey was conducted among 727 respondents and results were analysed using conditional process modelling. No significant direct or indirect relationship between the amount of time spent playing team-based PvP games and in-game prosocial behaviour was found. However, an exploratory linear regression analysis revealed a significant, positive relationship between in-game and offline prosocial behaviour. Implications and recommendations for future research are discussed.

Keywords

Online videogames; prosocial behaviour; cooperation; competition; interdependence; reciprocity

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Introduction

Gamers are often stereotyped as antisocial people who choose to play videogames alone to the detriment of their social relationships (Griffiths, Davies, & Chappell, 2004; Jansz & Martens, 2005; Kowert, Festl, & Quandt, 2014). Contributing to the negative portrayal of gamers, media and politicians have frequently drawn attention to alleged links between tragic events and playing videogames (American Psychological Association, 2015; Copenhaver, 2015; Sternheimer, 2007). For example, videogames were used as a scapegoat for shootings in El Paso, Texas and Dayton, Ohio in 2019 (Cole, 2019). It has been argued that perpetrators of such events are socially isolated gamers who are modelling behaviour learned by playing videogames, even though gaming can be a social activity. Statistics have shown that 56% of people who play games most frequently play with others, either with friends or family members in the same room, or via multiplayer online games (MOGs; Entertainment Software Association, 2018). In addition, 55% of people who play games most frequently agree that videogames help them to connect with friends (Entertainment Software Association, 2018).

Research has previously examined the social consequences of playing videogames (Greitemeyer & Mügge, 2014), and found that there may be some validity to the concern that playing videogames can encourage violent and antisocial behaviour. Thus, studies have focused on how this activity impacts aggressive behaviour and aggressive thoughts (e.g., Anderson, 2004; Anderson & Bushman, 2001; Sherry, 2001). That being said, it is becoming increasingly evident that videogames do not solely produce negative outcomes. Research has shown that prosocial videogames have the potential to reduce aggressive cognition and aggressive behaviour towards others (Liu, Teng, Lan, Zhang, & Yao, 2015), and to promote prosocial behaviour, such as helping others (Gentile et al., 2009; Ihori, Sakamoto, Shibuya, & Yukawa, 2007; Prot et al., 2014). Thus, both negative and positive effects may result from playing videogames. Such research on social behaviour in relation to playing videogames has often focused on the content of videogames and has assigned the content to mutually exclusive categories of pro and antisocial gameplay (e.g., Anderson, 2004; Anderson & Bushman, 2001; Greitemeyer & Osswald, 2011; Prot et al., 2014; Sherry, 2001). However, many videogames have both pro and antisocial content, which needs to be taken into consideration (Passmore & Holder, 2014).

Furthermore, social behaviour is not solely learned through the content of videogames, but also through the social context in which they are played. This social context can be cooperative or competitive. In Greitemeyer's (2013) study, participants who played videogames cooperatively (in pairs) subsequently showed more empathic concerns towards others than those who played alone. Playing videogames cooperatively has also been associated with less aggressive behaviour

towards others, regardless of the game's content (Jerabeck & Ferguson, 2013).

Most research on cooperative versus competitive gaming is solely focused on playing videogames in pairs and does not address playing in larger groups (e.g., Dolgov et al., 2014; Greitemeyer, 2013; Greitemeyer & Cox, 2013; Jerabeck & Ferguson, 2013). An exception is a study by Velez and Ewoldsen (2013), in which the authors examined social behaviour while playing videogames in groups and found that people who often play videogames in settings that are simultaneously cooperative and competitive (in teams against others) engage in more helping behaviour than people who play videogames exclusively cooperatively (in pairs against the game) or competitively (alone against other players). The current study aims to extend these initial findings by examining the relationship between playing cooperative-competitive MOGs in teams and in-game prosocial behaviour.

Theoretical Background

Cooperative-Competitive Gaming and Prosocial Behaviour

Previous research has often dichotomized the social context of play into two categories: cooperation and competition (e.g., Ewoldsen et al., 2012; Greitemeyer, Traut-Mattausch, & Osswald, 2012; Velez et al., 2012), but the two need not be in binary opposition and are in fact often found in combination. In many popular MOGs, players form teams that work together to win against other teams. Hereafter, this is defined as "team-based player versus player (PvP) gaming." This type of gameplay can be recognized in different subgenres of MOGs, such as multiplayer online battle arenas (MOBAs), massive multiplayer online roleplaying games (MMORPGs), and battle royale games.

Team-based PvP games are often designed to encourage cooperation such as helping or healing other players (Rocha, Mascarenhas, & Prada, 2008). Researchers have demonstrated that prosocial effects can result from playing videogames in a cooperative social context. For example, Ewoldsen et al. (2012) and Greitemeyer et al. (2012) found that cooperative play increased subsequent offline prosocial behaviour. As team-based PvP games encourage cooperation through game mechanics, they may invoke prosocial behaviour through elements of cooperation as well. This led us to formulate our first hypothesis:

H1: The amount of time spent playing team-based PvP games is positively related to in-game prosocial behaviour.

Expectations of Prosocial In-Group Reciprocity

Although the theory of Bounded Generalized Reciprocity (BGR; Yamagishi, Jin, & Kyonari, 1999) has yet to be applied to team-based PvP games, it has been applied on exclusively cooperative videogame spaces to explain prosocial behaviour (e.g., Breuer, Velez, Bowman,

Wulf, & Bente, 2017; Greitemeyer & Cox, 2013; Velez, 2015; Velez, Greitemeyer, Whitaker, Ewoldsen, & Bushman, 2016). BGR theory proposes that when groups compete against each other, each group member behaves in a manner that guarantees their individual success (Yamagishi et al., 1999). In-group members reciprocate prosocial behaviour and therefore achieve individual success by conforming to a group heuristic. In other words, in order to guarantee their individual success, group members must invest in the interests of their own group by behaving prosocially (Yamagishi et al., 1999).

The principles of BGR theory are similar to those of the Social Identity Theory (SIT), which posits that people generally follow the norms of the social groups they identify with in order to positively distinguish their groups from other groups (Tajfel & Turner, 1979; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). This view is consistent with the literature on social norms and conformity, which posits that behaving according to group norms results in social approval and recognition (Batson & Powell, 2003; Cialdini & Goldstein, 2004; Cialdini, Reno, & Kallgren, 1990). Thus, if behaving prosocially towards in-group members is considered a group norm, group members will likely adhere to this norm.

With regard to team-based PvP games, the clear presence of an out-group, i.e., the opposing team, could activate players' group heuristic regarding expectations of prosocial reciprocity, even more than purely cooperative games that are played against the computer (Velez & Ewoldsen, 2013). Players that engage in frequent team-based PvP gaming might expect more prosocial in-group reciprocity. Based on the BGR and the SIT theory, we anticipated that more expectations of prosocial in-group reciprocity would be related to more prosocial behaviour while gaming. This led us to formulate our second hypothesis:

H2: The amount of time spent playing team-based PvP games is positively related to the amount of expectations of prosocial in-group reciprocity (H2a), which, in turn, is positively related to in-game prosocial behaviour (H2b).

Group Interdependency

While the clear categorisation of an in-group and out-group in team-based PvP games may fuel the expectation of prosocial in-group reciprocity, this expectation may not always lead to prosocial behaviour. When group members feel that they are guaranteed a positive outcome, such as winning the game, they may perceive zero dependence on others and may not feel the need to behave prosocially towards other group members to achieve individual success (Karp, Jin, Yamagishi, & Shinotsuka, 1993). Some players might believe that their personal skills exceed the requirements to win, which, in their view, makes other team members' skill level irrelevant. In addition, some teams may outperform other teams, causing the leading team to believe that winning is guaranteed and making prosocial behaviour trivial.

That being said, interdependency still remains an important factor in team-based PvP games, where achievement of individual goals often depends on the actions of others (Rocha et al., 2008). In *Squad* (Offworld Industries, 2015), a team-based PvP shooter game, players are assigned different character roles which need to be carried out successfully in order to win the game. The character role determines the equipment and abilities of the player: the rifleman is the only character who can resupply other players' ammunition, the medic is the only one with a first-aid kit, and the sapper is equipped with binoculars to scout enemy positions and guide fire.

Previous literature on the sources of dependence among team members has identified three types of group interdependence (Johnson & Johnson, 1989; Van der Vegt, Emans, & Van de Vliert, 1998; Wageman, 1995), which we applied to team-based PvP gaming: initiated task interdependence, received task interdependence, and outcome interdependence. The sharing of knowledge, such as enemy positions, and resources, such as ammunition, can be seen as examples of task interdependence (Van der Vegt et al., 1998) which is experienced when the tasks in a team are interconnected. This concept can be divided into two categories: initiated task interdependence and received task interdependence (Kiggundu, 1981). Initiated task interdependence concerns the extent to which people perceive that group members are dependent on them, whereas received task interdependence concerns the extent to which people perceive that they are dependent on group members (Kiggundu, 1981).

Another relevant type of group interdependence is positive outcome interdependence. This concerns dependence and alignment between positive personal outcomes of individuals and goal attainment of the other group members (Van der Vegt et al., 1998). In the case of *Squad*, players might perceive that their own success positively depends on the success and goal attainment of other teammates. Positive outcome interdependence should result in prosocial behaviour towards others (Johnson, Johnson, & Smith, 2007). Thus, perceptions of initiated and received task interdependence as well as outcome interdependence may positively influence prosocial behaviour towards teammates.

Players might be less likely to act prosocially based on their expectations of prosocial reciprocity when they perceive low group interdependence and more likely when they perceive high group interdependence. Thus, the three types of group interdependence moderate the relationship between the expectation of in-group reciprocity and prosocial behaviour (see Figure 1). This led us to formulate our third hypothesis:

H3a: The relationship between the expectation of prosocial in-group reciprocity and in-game prosocial behaviour strengthens when *initiated* task interdependence is high compared to when it is low.

H3b: The relationship between the expectation of prosocial in-group reciprocity and in-game prosocial behaviour strengthens when *received* task interdependence is high compared to when it is low.

H3c: The relationship between the expectation of prosocial in-group reciprocity and in-game prosocial behaviour strengthens when *outcome* interdependence is high compared to when it is low.

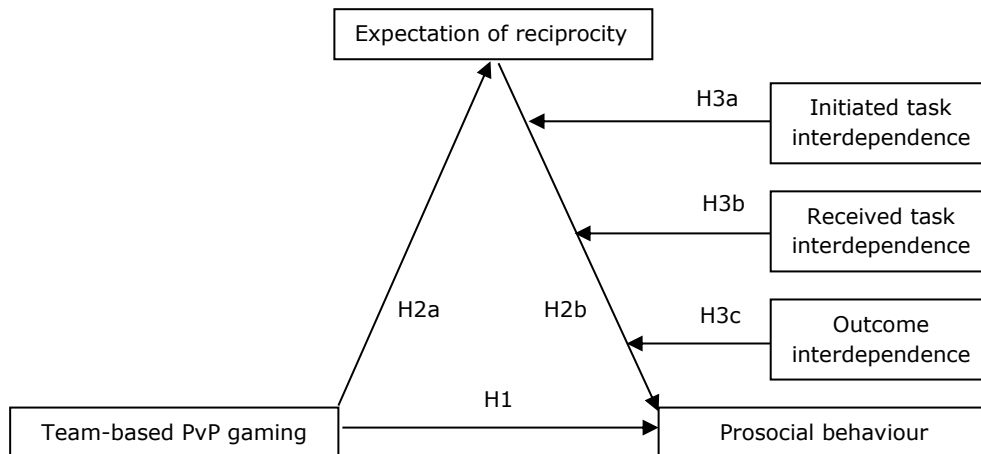


Figure 1. Conceptual model of the hypotheses.

In-Game and Offline Prosocial Behaviour

Online prosocial behaviour while playing team-based PvP games may impact offline prosocial behaviour. The General Learning Model (GLM; Buckley & Anderson, 2006) describes how the content of videogames can evoke both short-term and long-term offline effects. Videogames that require prosocial behaviour to progress often offer incentives to encourage this behaviour (Passmore & Holder, 2014). In *Farm Together* (Milkstone Studios, 2018), for example, players are rewarded with a temporary in-game boost on their own farms if they decide to help others with theirs. These kinds of game mechanics constantly stimulate prosocial behaviour, which in turn primes prosocial associations and scripts in players' brains that are activated outside of videogames (Buckley & Anderson, 2006). According to the GLM, frequent engagement with videogames that contain prosocial content would result in long-term prosocial changes in behaviour and personal characteristics by bringing out permanent changes in schemata and attitudes. This view is supported by longitudinal studies that found a positive relationship between playing prosocial videogames and prosocial behaviour and traits (Gentile et al., 2009; Ihori et al., 2007). Increased in-game prosocial behaviour may thus lead to an increase in offline prosocial behaviour.

While the GLM and the studies of Gentile et al. (2009) and Ihori et al. (2007) focus on videogames with high prosocial content, team-based PvP games also offer rewards for prosocial behaviour. In shooter games such as *Battlefield V* (DICE, 2018), healing and resurrecting teammates

is encouraged by recognising the player's feats with points, achievements, and other in-game bonuses. Therefore, the extent to which the player engages in online prosocial behaviour in team-based PvP games could be positively related to the extent to which they engage in offline prosocial behaviour. This pushed us to formulate a fourth, exploratory, hypothesis:

H4: In-game prosocial behaviour is positively related to offline prosocial behaviour.

Methods

Research Design

Many studies on the social context of gaming and prosocial behaviour consist of experiments that have been conducted in laboratories (e.g., Ewoldsen et al., 2012; Greitemeyer, 2013; Jerabeck & Ferguson, 2013; Velez et al., 2016). While experiments can establish causality, they often have low ecological validity, and the generalisability of these experiments is debated (Lobel, Rutger, Stone, Burk, & Granic, 2017). Artificially created conditions for cooperation and competition may not provide accurate insight into the natural environment in which people play videogames (Velez & Ewoldsen, 2013). For this reason, this study used an online survey to examine our hypotheses.

Respondents

The target population of this study were videogame players that engage in online team-based PvP gaming. The survey (see Appendix 1) was distributed via Reddit (on the subreddits of specific games [e.g., /r/DotA2] and subreddits related to gaming in general [e.g., /r/truegaming]), Discord servers, WhatsApp and Telegram groups, and at a LAN event in The Netherlands (The-Party 17). Respondents were recruited using non-probability sampling (e.g., convenience and snowball sampling), and a videogame gift card was raffled to encourage participation.

The survey was completed by 743 respondents, 16 of whom were excluded from the dataset because straight lining was detected. This resulted in a final sample of 727 respondents between the ages of 18 and 61 ($M = 24.1$, $SD = 6.0$), of which 91.5% were males, 6.6% were females, and 1.9% identified as another sex or did not want to disclose their sex. The sample consisted of people of 76 nationalities. The five most common were American (30.8%), Dutch (10.7%), British (6.6%), German (6.0%), and Canadian (4.7%). The remaining 41.2% was divided among the other nationalities. Of the respondents, 0.3% had only completed primary school, 23.1% were educated at the secondary level, 10.2% had completed intermediate vocational education (or similar level of education), 54.7% had a bachelor's degree, 9.3% had a master's degree, and 1.8% had a doctoral degree.

Overall, the respondents played 90 different team-based PvP games. *Dota 2* (Valve Corporation, 2011) was mentioned most frequently by the

respondents (27.9%), followed by (versions of) *Counter-Strike* (Valve Corporation, 2000; 11.1%;), *Call of Duty* (Infinity Ward, Treyarch, & Sledgehammer Games, 2003; 7.6%), *Apex Legends* (Respawn Entertainment, 2019; 6.6%), *League of Legends* (Riot Games, 2009; 5.6%), *Overwatch* (Blizzard Entertainment, 2016, 4.9%), and *Fortnite* (Epic Games, 2017; 4.5%).

Procedure

The survey was conducted online in English. Upon opening the survey, respondents were informed about the subject of the study and were asked to give their consent. Participation took about 5–10 minutes, and respondents could withdraw from the study at any time. We sought respondents who were aged 18 and above and had experience playing team-based PvP videogames. A few examples of team-based PvP games were given to help participants determine their eligibility. All involvement in the study was anonymous and held no consequences or risks.

Respondents were asked about the amount of time they spent playing team-based PvP games, expectations of reciprocity, prosocial behaviour towards teammates, offline prosocial behaviour, and group interdependence. They also answered demographic questions about their age, nationality, sex, and education. At the end of the study, respondents were thanked for their participation, given the option of taking part in the gift card raffle, and informed that any further queries regarding the study could be communicated via email.

Measures

In-Game Prosocial Behaviour

In-game prosocial behaviour was measured with the Revised Prosocial Tendencies Measure (PTM-R; Carlo, Hausmann, Christiansen, & Randall, 2003). The original scale consisted in 25 statements measuring six types of prosocial behaviour. From each type, two statements were selected and adjusted to match the context of play, resulting in a total of 12 statements. Since the PTM-R scale measures prosocial tendencies or intentions rather than actual behaviour, the statements were reformulated to measure behaviour. An example of a statement was: "I help teammates who are in a real crisis or need." The items were measured on a five-point scale, from "does not describe me at all" (1) to "describes me completely" (5). A principal component analysis was executed, and three items were excluded to create a one-dimensional scale ($KMO = .795$). The component had an eigenvalue of 3.28 and explained 36.48% of the total variance. A reliability analysis ($\alpha = .77$) revealed that the scale ($M = 3.48$, $SD = 0.55$) was reliable.

Team-Based PvP Gaming

To measure the amount of team-based PvP gaming, part of the General Media Habits Questionnaire from Anderson and Dill (2000) was used.

Respondents were asked: "How many hours a week do you engage in team-based PvP gameplay?" We used answer options from the national statistics office of The Netherlands (CBS, 2009) that measure one's television consumption. The answer options ranged from "less than 1 hour" (1) to "more than 40 hours" (7). On average, respondents spent 5–10 to 10–20 hours per week playing team-based PvP games ($M = 3.78$, $SD = 1.40$).

Expectations of Prosocial Reciprocity

To measure the expectation of prosocial reciprocity from teammates, a new scale was composed to fit the specific type of expectations proposed by the BGR theory (Yamagishi et al., 1999). The scale consisted of four statements with answer options ranging from "strongly disagree" (1) to "strongly agree" (5). An example of a statement was: "I expect my teammates to help each other." A principal component analysis ($KMO = .740$) revealed that the scale was one-dimensional. The component had an eigenvalue of 2.32 and explained 58.00% of the total variance. A reliability analysis ($\alpha = .76$) showed that the scale ($M = 3.65$, $SD = 0.86$) was reliable.

Initiated and Received Task Interdependence

Initiated and received task interdependence were measured with existing scales from Van der Vegt et al. (1998). Both scales contained four statements with answer options ranging from "strongly disagree" (1) to "strongly agree" (5), which were adapted to the gaming context. An example of a statement from the initiated task interdependence scale was: "My teammates depend on my presence, help and support"; an example from the received task interdependence scale was: "I depend on the presence, help and support of my teammates." A principal component analysis (forced on two factors) revealed that the statements of both types of task interdependence loaded on separate factors ($KMO = .741$). The component of initiated task interdependence had an eigenvalue of 3.07 and explained 38.39% of the variance. A reliability analysis ($\alpha = .71$) revealed that the scale ($M = 3.74$, $SD = 0.76$) was reliable. The component of received task interdependence had an eigenvalue of 1.20 and explained 14.96% of the variance. A reliability analysis ($\alpha = .68$) showed that this scale ($M = 3.56$, $SD = 0.82$) was reliable as well.

Outcome Interdependence

To measure outcome interdependence, an existing scale from Van der Vegt et al. (1998) was adjusted to suit the gaming context. The scale consisted of six statements, with answer options ranging from "strongly disagree" (1) to "strongly agree" (5). An example of a statement was: "It benefits me when my teammates attain their goals." A principal component analysis was performed and forced on one component ($KMO = .786$). The component had an eigenvalue of 2.83 and explained 47.15% of the total variance. A reliability analysis ($\alpha = .75$) revealed that the scale ($M = 4.34$, $SD = 0.51$) was reliable.

Offline Prosocial Behaviour

To measure offline prosocial behaviour, the PTM-R scale (Carlo et al., 2003) was used and adapted to this study. The same twelve statements that were selected for in-game prosocial behaviour were used. An example of a statement was: "I help people who are in a real crisis or need." We removed the same statements that were deleted for in-game prosocial behaviour to create a one-dimensional scale ($KMO = .845$). The eigenvalue of this component was 4.16 and the component explained 46.19% of the total variance. A reliability analysis ($\alpha = .84$) showed that the scale ($M = 3.63$, $SD = 0.70$) was reliable.

Control Variables

Nationality, age, sex, level of education, and the number of years that someone had been playing team-based PvP games were included as potential control variables. Nationality was measured with 201 answer options in a dropdown list. Age was measured with an open answer option, where a number from 18 to 99 could be entered. Sex was measured with four answer options: "male," "female," "other" (with an open answer option), and "I would rather not say." Education (completed or currently enrolled) was measured with the following answer options: "primary school," "high school," "intermediate vocational education," "bachelor's degree," "master's degree," "doctorate," and "other" (with an open answer option). The number of years that someone had been playing team-based PvP videogames was measured with answer options taken from Morschheuser, Riar, Hamari, and Maedche (2017) and ranging from "less than 1 year" (1) to "more than 3 years" (4). On average, respondents had been playing team-based PvP videogames for 2–3 to more than 3 years ($M = 3.87$, $SD = 0.45$).

Analyses

The data was analysed using conditional process modelling with Hayes's PROCESS macro (2017) in the Statistical Package for Social Sciences software (SPSS 23). This macro offers the possibility to simultaneously perform a regression-based analysis of the direct, indirect, and moderating effects in the conceptual model (see Figure 1). The PROCESS macro also produces an index of moderated mediation, which indicates at first glance whether the tested models are significant. We used an alpha level of .05 as a significance criterion for all statistical tests.

To test hypotheses 1 and 2, the predefined standard mediation model (model 4) of the PROCESS macro was used. To test hypothesis 3, a predefined moderated mediation model (model 16) of the PROCESS macro was used. Model 16 allowed us to test a moderated mediation model in which the indirect effect of the mediator on the dependent variable was moderated by two variables. However, three moderators were tested in the model by including initiated task interdependence as well as an interaction term of initiated task interdependence and

expectations of prosocial reciprocity. Finally, a linear regression analysis was conducted to examine the relationship between in-game and offline prosocial behaviour. Linear regression models the (linear) relationship between the conditional means of two variables (Lewis-Beck, Bryman, & Futing Liao, 2004).

Results

Correlations

Before testing the hypotheses, we computed a correlation matrix to examine whether potential control variables correlated with in-game prosocial behaviour. Only sex correlated with in-game prosocial behaviour ($r(726) = 0.112, p = .003$) and was included as a covariate in the analyses.

Hypothesis Testing

Hypothesis 1 predicted that the amount of time spent playing team-based PvP games would be positively related to prosocial in-game behaviour. The results of the analysis showed no statistically significant association between these two variables ($b = 0.004, t(727) = 0.71, p = .81, 95\% \text{ CI}[-0.03, 0.03]$). Therefore, hypothesis 1 was rejected.

Hypothesis 2 stated that the relationship between the amount of time spent playing team-based PvP games and in-game prosocial behaviour would be mediated by the expectation of prosocial in-group reciprocity. The analysis showed no mediation: The indirect effect of team-based PvP gaming on in-game prosocial behaviour via the expectation of prosocial reciprocity was not statistically significant (indirect = $-0.01, SE = 0.01, 95\% \text{ CI}[-0.02, 0.01]$). Thus, hypothesis 2 was rejected.

However, the correlation between the expectation of prosocial reciprocity and in-game prosocial behaviour was statistically significant ($b = 0.23, t(709) = 9.00, p < .001, 95\% \text{ CI}[0.18, 0.27]$), and the model explained 11% of the variance ($R^2 = 0.11, F(3,723) = 29.99, p < .001$). In other words, as expectations of prosocial in-group reciprocity increase, in-game prosocial behaviour also increases.

Hypothesis 3 stated that the relationship between the expectation of prosocial in-group reciprocity and in-game prosocial behaviour would be strengthened when initiated task interdependence (H3a), received task interdependence (H3b), and outcome interdependence (H3c) are high, and is weakened when they are low. The analysis revealed no moderation of initiated task interdependence ($b = -0.03, t(717) = -0.98, p = .33, 95\% \text{ CI}[-0.10, 0.03]$), received task interdependence ($b = -0.01, t(717) = -0.28, p = .78, 95\% \text{ CI}[-0.06, 0.05]$), or outcome interdependence ($b = -0.01, t(717) = 0.24, p = .81, 95\% \text{ CI}[-0.10, 0.08]$). Therefore, hypothesis 3 was rejected.

Based on this analysis, the expectation of prosocial reciprocity no longer significantly predicted in-game prosocial behaviour ($b = 0.38$, $t(717) = 1.78$, $p = .08$, 95% CI[-0.04, 0.79]). The results of the analysis are shown in Figure 2.

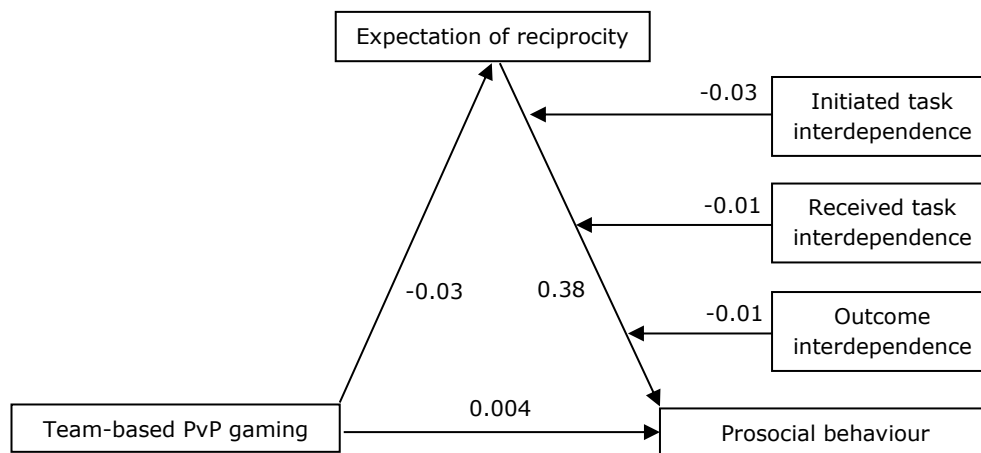


Figure 2. Schematic view of the results in the conceptual model.

Exploratory Analysis

Hypothesis 4 predicted that in-game prosocial behaviour would be positively related to offline prosocial behaviour. The results showed that in-game prosocial behaviour was indeed positively related to offline prosocial behaviour ($b = 0.57$, $t(724) = 15.00$, $p < .001$, 95% CI[0.50, 0.65]). Thus, hypothesis 4 was supported.

Discussion

The aim of this study was to examine whether playing team-based PvP games was related to in-game prosocial behaviour. Our findings suggest that cooperative-competitive players do not act more or less prosocially as they spend more time playing. In addition, this study explored the potential relationship between in-game and offline prosocial behaviour, finding a positive relationship: the higher the extent of online prosocial behaviour in team-based PvP games, the higher the extent of offline prosocial behaviour.

It was hypothesized that the amount of time spent playing team-based PvP games would be positively associated with prosocial behaviour via increased expectations of prosocial reciprocity. However, our findings suggest that these expectations do not increase as players spend more time playing team-based PvP games, which in turn do not predict in-game prosocial behaviour. This contradicts previous studies that suggest that expectations of prosocial reciprocity predict prosocial behaviour while playing videogames cooperatively (Breuer et al, 2017; Greitemeyer & Cox, 2013; Velez, 2015).

These unexpected findings may be attributed to two factors. Firstly, players in teams often have different roles: some may be built into the

game and others may be socially determined. An example of a built-in role would be a class that players can choose (such as a healer) whereas a socially determined role would be one decided by players (such as an appointed guild leader). Some respondents indicated that they often play a role in which it is not expected or desirable for them to help others. They further explained that some roles explicitly encourage or require players to help their teammates while other roles do not. Players in supportive roles may be better equipped to help others, while players in offensive roles might prefer killing a dangerous enemy instead of saving a teammate.

Secondly, there are different subgenres within team-based PvP games, such as the previously discussed MOBAs, MMORPGs, and battle royale games. Different social norms apply in different subgenres of team-based PvP games, and they are not necessarily prosocial. For example, the community of the MMORPG *Guild Wars 2* (ArenaNet, 2012) is often considered friendly, whereas the community of the MOBA *League of Legends* is generally viewed as antisocial and even toxic (Bonenfant, St-Martin, Prigent, & Crémier, 2018). It has been observed that in *League of Legends*, conflicts frequently arise between teammates (Bonenfant et al., 2018). Having a seemingly less skilled teammate may increase tensions, conflicts, and the occurrence of bullying in a team (Bonenfant et al., 2018), whereas advising teammates can be seen as insulting rather than helpful (Kou & Gui, 2014). Antisocial behaviour towards others may also be trivialized and normalized in games like *League of Legends*, since players are completely anonymous and likely to never meet again (Bonenfant et al., 2018). In contrast, in MMORPGs, players unite in clans or guilds that exist over a longer period of time, allowing players to become better acquainted with each other.

Anonymity and playing videogames with strangers in contrast to playing with friends may, in accordance with the Social Identity Model of Deindividuation Effects (SIDE; Postmes, Spears, & Lea, 1998), cause people to become deindividuated and lose their sense of responsibility and accountability. Behaviour such as grieving (intentionally causing others harm for personal gain) usually occurs under anonymous conditions (Achterbosch, Miller, & Vamplew, 2017). In the case of this study, respondents might have felt less inclined to act prosocially towards others since they will never meet them again. Thus, acting prosocially might not be a norm in (some) team-based PvP games.

Lastly, this study found that online prosocial behaviour in team-based PvP games is associated with offline prosocial behaviour in team-based PvP games. This notion is supported by longitudinal research on the impact of playing prosocial videogames on offline prosocial behaviour (Gentile et al., 2009; Iori et al., 2007). This is reinforced by the principles of the GLM (Buckley & Anderson, 2006), which highlights that acting prosocially in a game may lead to acting more prosocially offline. From this perspective, it may be possible that acting more prosocially

while playing team-based PvP games leads a player to act more prosocially offline.

Limitations and Recommendations for Future Research

We would like to address a few limitations and recommendations for future research. Firstly, in terms of age and sex, our sample is representative of the cooperative-competitive gaming population but may not be representative of other characteristics of this population or of the overall gaming population. Statistics show that the average age of esports players in North America spans between 24 and 27 years old (Statista, 2015), and that 90% of MOBA players and 93% of first-person shooter players are male (Statista, 2017). This is similar to the average age (24.1) and percentage of males in our sample (91.5%). Nevertheless, future studies should aim to study a sample with a greater variety of age and gender.

Furthermore, all variables in our study were measured using self-reported data, which is susceptible to self-report and social desirability bias. Respondents might have felt pressured to present their behaviour and habits—including the extent of prosocial behaviour and time spent playing videogames—in a more favourable light. Future survey studies could combat social desirability bias by using various prevention and detection methods (for an overview, see Nederhof, 1985). Experimental studies, which measure actual behaviour rather than self-reported behaviour, could also be conducted to combat self-report bias and to complement survey studies. In addition, experimental and longitudinal studies may be able to establish casual relationships, notably between in-game and offline prosocial behaviour.

Lastly, we examined group interdependence as a potential moderator of the mediated relationship between the amount of team-based PvP gaming and in-game prosocial behaviour by expectations of reciprocity. However, group interdependence and expectations of reciprocity may be related differently. It is possible that group interdependence is a predictor of expectations of prosocial reciprocity, rather than a moderator of the relationship between expectations of prosocial reciprocity and prosocial behaviour. Future research may provide additional insights into these relationships. Experimental studies could compare the effects of playing high versus low interdependence games on expectations of prosocial reciprocity and (in-game versus offline) prosocial behaviour.

In summation, this study examined group interdependence and the expectation of in-group prosocial reciprocity in relation to prosocial behaviour in team-based PvP videogames. Findings indicate that players do not act increasingly prosocial in-game as they spend more time playing games, but also indicate that they do not act less prosocially as they play more. Our findings also suggest that there is a relation between in-game and offline prosocial behaviour, which implies that

acting prosocially in team-based PvP games could lead to acting prosocially offline. This study proposes that the accusations of videogames making players antisocial and violent are incorrect, and that positive social effects may result from playing videogames, which warrants further exploration of these topics.

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Appendix 1

Survey

Page 1

Thank you for your willingness to participate in this study.

This questionnaire is focused on the social behaviour of gamers. This means you will be asked a couple of questions about your social behaviour, expectations and experiences while gaming and in real life.

We're only looking for people that engage in gameplay in which a team of players competes with another team of players. It does not matter how much you play, as long as you sometimes do.

Some games with this type of gameplay are League of Legends, Dota 2, Rocket League, Counter-Strike, Battlefield V, Apex Legends, World of Warcraft and Fortnite.

But there are many other games that also offer this type of gameplay.

You may optionally leave your email address at the end of this survey for a chance to win a Steam gift card of €20.

Do you want to participate in this study?

- Yes, I want to participate.
- No, I do not want to participate.

Page 2

Thank you for participating in this research. Please read the information below about what you can expect regarding your participation.

This research is carried out as part of the Communication Science master's programme at the Radboud University in Nijmegen, The Netherlands. This questionnaire will take about 5-10 minutes. Also, you must be at least 18 years old to take part in this study.

Participating in this study is entirely voluntary. You may, at any time during this questionnaire, withdraw from participating in this study without providing a reason. All data collected through this research will be treated with the utmost confidentiality. The answers you provide during this questionnaire cannot be traced back to you as an individual and are completely anonymous. If you have any questions about this study, please feel free to send an email to: info@socialgamingresearch.nl.

By selecting "Yes, I consent", you confirm that you have carefully read and fully understand the above information, voluntarily participate in this study, and are at least 18 years old.

- Yes, I consent.
- No, I do not consent.

Page 3

Many popular multiplayer online games offer gameplay that involves a **team of players competing against another team of players**. In this questionnaire this type of gameplay will be called 'team-based PvP' (player versus player) gameplay.

Some examples of games with team-based PvP gameplay are League of Legends, Dota 2, Rocket League, Counter-Strike, Call of Duty, Battlefield V, Apex Legends, Fornite, PUBG, GTA V, RuneScape and World of Warcraft.

But there are many other games that also offer this type of gameplay.

Do you ever engage in this particular type of gameplay?

- Yes.
- No.

Page 4

Please offer a little bit of insight about your team-based PvP gaming habits, by answering the questions below.

How many hours a week do you engage in team-based PvP gameplay?

- Less than 1 hour
- 1-5 hours
- 5-10 hours
- 10-20 hours
- 20-30 hours
- 30-40 hours
- More than 40 hours

How many years have you been engaging in team-based PvP gameplay?

- Less than 1 year
- 1 to 2 years
- 2 to 3 years
- More than 3 years

Please list a maximum of three videogames you play, in which you also engage in team-based PvP gameplay:

Page 5

Below are a number of statements about expectations that you may or may not have about teammates **while playing with them in a team-based PvP context**.

Please indicate how much you agree or disagree with each of the following statements¹:

- I expect my teammates to help each other.
- I trust that my teammates will help me.
- If I help my teammates, I am certain one of them will help me as well.
- If you're helpful and kind to your teammates, they will act the same way towards you.

Page 6

Below are a number of statements about social behaviour towards teammates **while playing with them in a team-based PvP context**, that may or may not describe you.

Please indicate how much each statement below describes you²:

- I help teammates best when other players are watching me.
- I comfort a teammate who is upset.
- When other players are around, I easily help teammates in need.
- I help teammates because it makes me look good.
- I help teammates who are in a real crisis or need.
- When teammates ask me to help them, I don't hesitate to do so.

¹ Measured in a matrix table, with the following answer options: "strongly disagree" (1), "somewhat disagree" (2), "neither agree nor disagree" (3), "somewhat agree" (4), "strongly agree" (5).

² Measured in a matrix table, with the following answer options: "does not describe me at all" (1), "describes me poorly" (2), "somewhat describes me" (3), "describes me well" (4), "describes me completely" (5).

- I share resources or information with teammates without anyone knowing.
- I share resources or information with teammates, especially when I get some benefit.
- I help teammates when they are in a bad situation.
- I help teammates without them knowing.
- I never wait to help teammates when they ask for it.
- I help teammates in emotional situations.

Page 7

Below are the same statements you just saw in the previous question, but this time they are about social behaviour **in real life**.

Please indicate how much each statement below describes you **in real life**³:

- I help others best when people are watching me.
- I comfort someone who is upset.
- When other people are around, I easily help others in need.
- I help others because it makes me look good.
- I help people who are in a real crisis or need.
- When people ask me to help them, I don't hesitate to do so.
- I donate money, goods or time without anyone knowing.
- I donate money, goods or time, especially when I get some benefit.
- I help others when they are in a bad situation.
- I help others without them knowing.
- I never wait to help others when they ask for it.
- I help others in emotional situations.

³ Measured in a matrix table, with the following answer options: "does not describe me at all" (1), "describes me poorly" (2), "somewhat describes me" (3), "describes me well" (4), "describes me completely" (5).

Page 8

This section of the questionnaire is about dependence between you and your teammates. You may agree or disagree with these statements.

The statements below are about **how dependent your teammates are on you** while playing together in a **team-based PvP context**.

Please indicate how much you agree or disagree with each of the following statements⁴:

- My teammates depend on me for information and advice.
- My teammates depend on me for materials, means and other things they need.
- My teammates depend on my presence, help and support.
- My teammates depend on me to do their task in the game well.

The next statements are about **how dependent you are on your teammates** while playing together in a **team-based PvP context**.

Please indicate how much you agree or disagree with each of the following statements⁴:

- I depend on my teammates for information and advice.
- I depend on my teammates for materials, means and other things I need.
- I depend on the presence, help and support of my teammates.
- I depend on my teammates to do my task in the game well.

Page 9

The statements below are about your success and the success of your teammates **while playing together in a team-based PvP context**. You may agree or disagree with each of the following statements⁴.

Please indicate how much you agree or disagree with each statement below:

- It benefits me when my teammates attain their goals.
- The things my teammates want to accomplish and the things I want to accomplish are compatible.
- It is advantageous for me when my teammates succeed in their tasks in the game.
- When my teammates succeed in their tasks, it is at my benefit.

⁴ Measured in a matrix table, with the following answer options: "strongly disagree" (1), "somewhat disagree" (2), "neither agree nor disagree" (3), "somewhat agree" (4), "strongly agree" (5).

- My concerns and those of my teammates are in harmony.
- When my teammates succeed in their tasks, it works out positively for me.

Page 10

The last part of this questionnaire concerns some demographic information about you. Please answer the following questions.

What is your nationality?

▼ Afghan ... Zimbabwean

What is your age?

What is your sex?

- Male
- Female
- Other: _____
- I would rather not say

What is the highest degree or level of school you have completed (or are currently enrolled at)?

- Primary school
- High school
- Intermediate vocational education
- Bachelor's degree
- Master's degree
- Doctorate
- Other: _____

Page 11

By clicking through to the next page you'll submit your answers to this questionnaire.

Thank you for participating.

If you'd like a chance to win a Steam giftcard of €20 for completing this questionnaire, please leave your email address below.

Your email address will not be used during the analysis of this research, is saved separately from your answers, and cannot be traced back to your answers.

If you have any questions about or remarks on this study, please feel free to send an email to: info@socialgamingresearch.nl.